

Dawn
Science Team Rules of the Road

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1 Introduction

1.1 Overview

The Dawn scientific investigations involve many scientific participants having overlapping roles. There are the mission co-investigators who formed the initial Science Team, who defined the mission's science objectives and participated in the mission design. There are also associates of the Dawn co-investigators at their institution who collaborate with the co-investigators. Additional participants will include as yet unselected participating scientists (PSs). There are also scientists and engineers on the Dawn Project staff with significant involvement in the mission. Meeting the scientific goals of the project requires coordinated interaction among all these participants (e.g., data sharing, interactive and interdisciplinary data analysis and interpretation, joint publications). Moreover, if this coordination is well conceived from the start, it can significantly influence the success of the mission by encouraging opportunities for interdisciplinary results and discoveries and by maximizing the impact of those results. While encouraging these interactions, the project must also encourage individual creativity and initiative and find ways to allow all members of the project team to benefit appropriately from the scientific successes of the mission.

The experiences of previous missions demonstrate that thinking through in advance how to manage the interactions and expectations of such a large and diverse group and getting "buy-in" from the leadership of the project to the approach to be followed is critically important. Although it is unlikely that all eventualities can be fully anticipated, the purpose of this document is to help ensure the orderly conduct of the Dawn science investigation by specifying the principles and ground rules that will underpin the project's approach to managing Dawn's integrated scientific investigations. A key aspect of this approach is to encourage and maximize the openness and transparency of the interactions within the Science Team and the project as a whole.

1.2 Scope

This plan is an agreement among Dawn Science Team members and collaborators (i.e., those listed in sections 6.1 and 6.2) covering the periods prior to arrival at each target, the period in orbit and during any extended mission until the data archiving is completed. It applies as well to the Participating Scientists selected to join the Dawn Science Team.

1.3 Revisions

This plan will be revised as needed to accommodate changes in the Dawn science investigation. Revisions to sections 6.1 (Dawn Science Team members) and 6.2 (Dawn Science Team collaborators) will require the approval of the Dawn Principal Investigator, the Dawn Deputy Principal Investigator, and the Dawn Program Scientist from NASA Headquarters, and will typically be proposed by a science team member. All other revisions require the same approvals as the plan itself.

1.4 Related Documents

Other project documents describe the roles and responsibilities of team members and the investigation plan. These documents are the Dawn Science Data Management Plan (JPL D-25901) and Dawn Science Plan (JPL D-31827), respectively. These documents should be consulted for information on Dawn science operations processes, plans and procedures, and the interfaces and processes that govern data acquisition, return, distribution, analysis and archiving.

2 Scientific Participants

2.1 Dawn Science Team Members

Achievement of the overall goals of Dawn will require integration of a wide range of geological, geochemical, and geophysical observations. The best chance of achieving these objectives will come from a “lumping” of the group into a single, interacting team rather than a “splitting” of it into isolated entities. Consequently, in this document, we define the members of the Dawn Science Team to include Dawn Co-Is and as-yet unchosen PSs. A complete list of current Science Team members is provided in section 6.1 of this document.

2.2 Dawn Science Team Collaborators

Collaborators will in many cases be deeply involved in the scientific work of the project, but they have lower levels of responsibility to the project than science team members and consequently lower privileges. Most Dawn Science Team collaborators will be specifically associated by name with a science team member or PS. Collaborators may either be specifically named on selected proposals or as-yet unnamed students, postdocs, and technical staff, working with team members at the same institution. In all cases, the team member with whom the collaborator is associated is responsible for the collaborator understanding and accepting these Rules of the Road. A complete list of Dawn Science Team collaborators is provided in section 6.2 of this document.

2.3 Additions and Deletions of Team Members and Collaborators

Addition of new team members and collaborators will be possible provided they have the approval of the PI, Deputy PI, and Program Scientist and satisfy relevant NASA requirements (e.g., for foreign participants). New team members and collaborators will typically be proposed by a science team member or PS. Note that if team members or collaborators disassociate from the Dawn project (e.g., by resigning), they are no longer bound by the Dawn Rules of the Road, provided the Science Team agrees to release them from these rules, with the exception that they may not submit papers based on Dawn data or otherwise release data to which they have had privileged access until the Dawn project releases those data to the public. All additions and deletions of team members and collaborators will be reflected in timely updates to sections 6.1 and 6.2 of this document.

3 Data Privileges Policies

We highlight here four types of data sharing and how they will be managed by the Dawn project:

- Data sharing within the Dawn project: Each investigation will provide processed data products fully, as soon as they are ready, to the DSC for project-wide distribution to the entire science team and to the engineering operations teams. This is expected to be important for several reasons, including (1) guiding operations, (2) strategic planning, which will require constant iteration based on knowledge of the full range of results across all investigations, and (3) maximizing the scientific benefit of the integrated Dawn mission (i.e., immediate data sharing across the entire science team will help with full interpretation of the data from all instruments). It will be the responsibility of individual team members to distribute data and data products in a timely fashion to their collaborators. Note that it is expected that data processing and interpretation will evolve (e.g., from provisionally analyzed to fully validated and archival data), and improved data products and interpretations will also be distributed within the project as they become available. As a general rule, any Dawn data products (including calibration data) will be made available to any Dawn team member or collaborator. The Dawn Science Data Management Plan defines the data products to be produced and distributed within a prescribed timeline.
- Data release to the general public: In order to engage the public, the Dawn Science Team will release subsets of recent particularly interesting data or data products from each of the science instruments in a timely fashion. In addition, NASA, through the Dawn project office, reserves the option to release or to direct the release of data or data products in support of public engagement.

Data not previously released to the public by NASA or Dawn and/or inferences or interpretations based on such data may only be released by science team members based on specific approval by the Science Team or through a Science Team-approved process for release approval; Co-Is and PSs will have the primary responsibility for representing and coordinating their teams regarding such data releases. Note that these required approvals also apply to web sites maintained by team members, collaborators, and their institutions, as well as any release of information to the internet (e.g. blogs).

At the discretion of NASA Headquarters or the Science Team, short-term embargoes on particular releases might occasionally be put in place (for example, in order to maximize the impact of a specific press conference or to comply with a particular journal publisher's request), but such embargoes are expected to be exceptions rather than the rule.

- Release of data and discussion of interpretations through the media (print/radio/TV/film): Interviews of Dawn Science Team members by the news media should be coordinated with the JPL Media Relations office. Each science team member may release data from their own scientific investigations to the press and discuss their interpretations through their home institution's media relations office, provided the

releases and discussions are approved by the science team after suitable consultation with the JPL Media Relations Office. Requests for such approval from team members are expected to be coordinated by the members of the Dawn Science Team (Co-Is and PSs), leaving at least several days advance notice for the approval. An important issue in interaction with the press will be to share credit appropriately within and across teams, and in giving its approval the science team will take particular care to ensure such sharing.

The Dawn Science Team will work with JPL Media Relations to develop more detailed guidelines for science team members being interviewed in special situations, for members being interviewed at different levels of public exposure, and for members who have had different levels of media training.

- *Data sharing with the science community:* It is NASA policy that investigators do not have exclusive use of data taken during the course of their investigation for any proprietary period. However, it is recognized that some time is required (no more than six months for the Dawn project) for data products to be generated and validated. Consistent with this, instrument leads will be responsible for delivery of assembled and validated Dawn data product volumes (Level 0 and 1 data, associated ancillary information, calibration data and information, and higher-level calibrated data products) to the PDS no more than six months after receipt on Earth. Archive volumes will be PDS-standards compliant. The documentation delivered to PDS that describes the higher-level products must include a complete description (techniques, algorithms, calibration measurements, and/or software when practical) such that a reasonably skilled end user has enough information to fully understand and reproduce any scientific results derived from the data products.

Before delivery to the PDS, no data products shall be released to the science community other than results contained in scientific publications (or supplemental data associated with such publications) or products released to the general public as described in the Dawn Science Data Management Plan and this Rules of the Road document. The importance of this cannot be overemphasized, and all team members and collaborators must be especially vigilant on this point; i.e., since we want everyone to be comfortable with complete openness within the project with respect to unpublished or incompletely processed or interpreted results, we must be especially careful not to violate the confidentiality of the group by broadcasting (even inadvertently) these hard-won data. An exception (see also section 4.2) is that selected results may be released to specifically chosen members of the community on an as-needed basis in order to enable their participation in the project when no team members or collaborators with adequate expertise are available (e.g., unanticipated results are encountered and no pre-selected team members or collaborators are experts in the area or have the time to devote to the new task); all such releases must be approved by the Principal Investigator, after consultation with the co-Is responsible for the data and/or the Science Team.

4 Publications

4.1 Overview- The Role of the Science Team

Peer-reviewed publication of the results of the Dawn science investigation will be the primary means of reporting these results and their interpretations to the scientific community. Such publications will also likely be the primary basis for the professional recognition that scientists associated with the project will earn from their participation with Dawn. Thus, clear guidelines for the preparation of journal articles and other professional communications are necessary, both to ensure effective communication of the results of the project and to ensure fair distribution of credit for these results and their interpretation. Given the large number of scientific participants, the integrated nature of most of the anticipated results (i.e., most publications will involve team members and collaborators associated with multiple investigations), and the importance that most scientists attach to obtaining recognition for their work, it is anticipated that the twin goals of effective communication and achieving equity may require delicate balance and coordination of the team and collaborators.

In view of the importance of the publication policy, its coordination and implementation will be the responsibility of the science team. It is envisioned that decisions on what papers will be written, on authorship, on which results will be put in which of the papers and so forth, will be worked out within the science team. This will give the science team responsibility for coordinating the dissemination of the results of the project and the responsibility for balancing issues of equity and quality among the many participants in the project, especially as they relate to allocation of credit for obtaining and processing data, for creativity and the development of interpretations and hypotheses, and for scientific leadership within the project. In this context, the science team will also have to respect divergent interpretations and, in particular, to encourage the publication of minority viewpoints (i.e., there will not likely be a monolithic project-wide interpretation of all the results) and the orderly publication of multiple interpretations of the same observations.

All team members and collaborators will be required to accept the decisions of the science team on matters regarding publications, and, most critically, for the time period covered by these rules (see section 1.2) no science team member or collaborator shall knowingly participate in any publication of results or interpretations of Dawn science data that has not been publically released unless they have received specific authorization from the science team to do so.

It is anticipated that the science team will confer regularly to monitor the progress of manuscripts in preparation, to discuss plans for future publications and their authorships (including suggestions from any team member or collaborator for possible publications), and to coordinate the flow of publications. It is also important to emphasize that these decisions will not simply be reached by a majority vote; for reasons of academic freedom and the encouragement of maximum creativity, minority viewpoints shall be respected and protected. Thus, although the expectation is that most decisions will be achieved by consensus, it is likely that this will not always be possible. In these cases, it will be the responsibility of the Principal Investigator to attempt to craft compromises that the science team will accept. In those rare cases where no

compromise that the entire science team can agree to can be brokered, it will be the responsibility of the PI to make a decision.

4.2 Authorship Guidelines

Authorship for all publications is open to all team members and collaborators, according to the following conditions:

- any team member who asks to be an author of any paper and who makes a substantive contribution to that paper (i.e., to the writing and/or to the research reported in the paper) shall be an author; and
- any collaborator who is invited by a team member to be an author on a paper and who makes a substantive contribution to that paper (i.e., to the writing and/or to the research reported in the paper) shall be an author.

Final decisions on authorship, either the inclusion or exclusion of people from the author list and the order of authors, will be made by the science team as part of its coordination of the entire publication process, taking care to balance the issues discussed in section 4.1. The appropriate authorship of papers will likely evolve during their preparation; the Science Team approved lead author of each paper will have access to the science team to discuss issues of concern and will be responsible for keeping the science team informed as to appropriate changes in authorship. The science team will likewise be responsible for keeping the full project membership informed of all ongoing and anticipated publications.

As described in section 3, members of the science community may be authors (including lead authors, where appropriate) of a project-sanctioned paper only if:

- their participation on the paper (including the research leading up to the paper) has been pre-approved by the science team based on a request from a team member; as described in section 3, approval by the science team will be based on the judgment that the outside scientist brings to the investigation some unique and necessary capability not possessed by any team member or collaborator (or appropriate team members or collaborators are unwilling or unable to perform the work); and also
- they make major substantive contributions to the investigation and/or to the writing of the paper.

4.3 Anticipated Publications

Although the actual schedule and nature of publications resulting from the Dawn project will necessarily depend on events that cannot be fully predicted, we nevertheless anticipate that publication will take place in four phases: instrument descriptions, preliminary reports, detailed reports, and follow-on science.

- *Publications prior to Vesta encounter:* Prior to Vesta encounter, the project will publish overviews of its plans and capabilities. In addition, a series of papers of investigations and instrument descriptions (including design and testing) will be published before

encounter; each instrument-specific publication in this series shall include an extensive description of calibration (unless a separate publication on calibration is prepared for that instrument). Note that it is expected that the author lists for these early publications describing instruments associated with particular investigations will generally not include all members of the science team, and may include many associates who are not formal collaborators.

- “Preliminary” reports: The Dawn project will oversee the publication of a set of papers roughly analogous to the “30-day reports” of past missions, although they will not necessarily be written on a 30-day timescale (the actual time scale will be established by the Dawn Science Team). They will be submitted to a peer-reviewed scientific journal that will provide timely publication. This set of papers will consist of one or more overview papers of key early findings, accompanied by a number of topical papers presenting these findings at a greater level of detail.
- Detailed reports and other peer-reviewed publications: After the publication of preliminary reports, the findings of the Dawn science investigation will be published (generally in peer-reviewed journals) as appropriate. It is likely (but not required) that in addition to stand-alone papers, one or more sets of papers will be submitted as parts of special issues of journals. Planning and scheduling of these publications will be worked out by the science team, but it is expected that there will be several coordinated waves of publications, plus a steady stream of individual papers over the course of the project. As with all other publications during the course of the mission, the science team will coordinate and oversee them. Note that with the passage of time, the coordination role of the science team may in some cases outweigh the oversight role, but the roles of the science team members in keeping the team working together effectively; in keeping the full group aware of results, interpretations, and intended publications; and in ensuring fairness will continue throughout the lifetime of the project.
- Use of the team website: All publications should be posted on the team website as soon as possible. These should be labeled as ‘Draft’, ‘submitted’, ‘In Press’, or ‘Published’ as appropriate.

4.4 Presentations at Scientific Conferences

It is anticipated that results of the Dawn investigation will be presented in forums such as scientific conferences. The science team will have the responsibility to oversee and coordinate these presentations, and team members and collaborators wishing to make such presentations should request authorization from the science team, leaving at least several days for advance approval. Authorship rules for such professional scientific presentations that take place within the time period covered by this document will be identical to those for peer-reviewed papers as stated in section 4.3, including those which are prepared and submitted prior to arrival at Vesta and Ceres. For abstracts where it is appropriate for all team members to be coauthors but length limits prevent all from being listed, the phrase “the Dawn Science Team” should be used. All

abstracts and presentations should be posted on the team website as soon as they become available.

4.5 Informal Talks

Giving informal talks where abstracts are not required (e.g., departmental colloquia and popular lectures) is permissible by all team members and collaborators, and advance project-level approval is not generally required. However, notification of such talks should be provided to the Principal Investigator. These presentations should not include data or results that have not previously been published (or distributed as part of a public release), archived in the PDS, or discussed at a scientific conference or workshop that included attendees not associated with the Dawn Science Team.

4.6 Follow-on Science

Follow-on science is any scientific research or publication six months after the end of the mission and any extensions or six months after a member leaves the science team. There are no restrictions on any subsequent work by any team member or collaborator after this period.

5 Operations Policies

5.1 Integrated Operations Environment Description

Science activity plans at Vesta and Ceres are generated and prioritized by the science team. The long-lead time of this process dictates that the planning will be nearly complete before the Participating Scientists join the science team

The process begins with the Dawn Science Plan which provides strategic (i.e. long-term) direction for orbital operations and guides the development of instrument sequence plans. Science team members associated with the instruments are responsible for providing sequence inputs to achieve the Science Plan. These instrument teams will include co-investigators and collaborators from the institutions providing the instrument as well as the at-large co-investigators and collaborators that share responsibility for the science investigations that rely on the instruments' data. The interface between the instrument sequencing and the mission is the Dawn Science Operations Support Team at JPL, and the Dawn Science Center at UCLA. The PI will arbitrate conflicts resulting from resource contention or lack of consensus on prioritization of activities. In cases where science activities may impact spacecraft health and safety, the project manager must be involved.

5.2 Inputs to Activity Planning

The instrument leads are responsible to provide all project-requested input to the activity planning process for their instruments, including activity dictionary inputs, resource models, and parameters for expansion into sequences. As discussed in 5.1 these activity plans shall be consistent with the Science Plan and developed in collaboration with the entire science team.

There may be limited opportunities for Participating Scientists to suggest changes to instrument sequence plans in advance of the final sequence builds.

5.3 Participation in Test and Training

The science team will make every effort to participate in appropriate pre-encounter development to support operations phase capabilities, including project-level test and training exercises.

5.4 Instrument Uplink Preparation

The instruments will be operated (command sequence generation and assignment of data downlink priority) in response to recommendations of the Dawn Science Team, subject to approval by the Dawn Flight Director, and the PI.

5.5 Instrument Use for Engineering Needs

Instrument activities performed for engineering purposes such as navigation will be given high priority when necessary as needed, on a limited basis. Such requests will be coordinated through the Dawn Science Operations Support Team lead.

6 Personnel Lists

6.1 Dawn Science Team Members

F. Capaccioni, INAF-IASF, Italy
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6.2 Dawn Science Team Collaborators

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JPL

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